

## SOUTH DAKOTA STATEWIDE FISHERIES SURVEY

2102-F21-R-40

Name: Curlew Lake County: Meade  
Legal description: T 3N, R 11E Sec. 2, 10, 11  
Location from nearest town: 8 mi. N, 4 mi. E, 1.5 mi. N of New Underwood, SD  
Dates of present survey: June 5-7, 2007  
Date last surveyed: June 26-28, 2006; October 13, 2006  
Most recent lake management plan: F21-R-36 Date: 2004  
Management classification: Warmwater permanent  
Contour mapped: Date: July 1994

Primary Species: (game and forage)

1. Black crappie
2. Largemouth bass
3. Northern pike
4. Walleye

Secondary and other species:

1. Bluegill
2. Yellow perch
3. Black bullhead
4. White sucker

### PHYSICAL CHARACTERISTICS

Surface Area: 136 acres; Watershed: 12,800 acres  
Maximum depth: 22 feet; Mean depth: 10.2 feet  
Lake elevation at survey (from known benchmark): -8 feet

#### 1. Describe ownership of lake and adjacent lakeshore property:

Curlew Lake is owned and managed by the Department of Game, Fish and Parks. All land bordering the immediate shoreline, excluding three quarter sections in Section 2 and a small tract of land comprising 10 acres in Section 11, are owned by South Dakota Department of Game, Fish and Parks. The 10-acre tract in Section 11 has a written access agreement with the landowner; the three quarter sections in Section 2 do not have active access agreements. There is no record of problems regarding public access across this section of land.

#### 2. Describe watershed condition and percentages of land use:

Curlew Lake watershed is comprised of 80% range and pasture lands and 20% cropland.

#### 3. Describe aquatic vegetative condition:

The lake level is extremely low due to continued years of drought. When water levels are high rooted aquatic vegetation appears along most of the shoreline. Bulrush is the primary emergent plant species associated with the lake. Coontail and grassy pondweed are abundant submersed vegetative species in the lake.

#### 4. Describe pollution problems:

Siltation at inlets and shorelines due to natural erosion around the reservoir and cattle grazing on the private tract and its shoreline has decreased depth and area within the lake. No other pollution problems were identified by department personnel during the 2007 survey.

#### 5. Describe condition of all structures, i.e. spillway, level regulators, boat ramps, etc.:

All access and regulatory structures appear to be in adequate condition.

## BIOLOGICAL DATA

### Methods

#### *Netting Survey*

A lake survey was conducted on June 5-7, 2007. Sampling consisted of 8 trap net nights (Appendix C). All trap nets were modified fyke-nets with a 1.3-X 1.5-m frame, 19.1-mm (0.75-inch) mesh and a 1.2- X 23-m (3.9- X 75.5-ft) lead. Collected fish were measured for total length (TL; mm) and weighed (g). In addition, scale samples for the first five fish per centimeter group were collected from selected fish per gear type for age and growth analysis. Scale samples were pressed onto acetate slides and viewed with a microfiche projector (40X) and the distance between scale annuli were recorded on paper strips. All data was entered into WinFin 2.95 (Francis 1999).

#### *Electrofishing Survey*

Due to extremely low water, no electrofishing was done in 2007.

#### *Data Analysis*

Fish population parameters, confidence intervals and standard errors were computed using WinFin Analysis (Francis 2000). Parameters calculated were catch-per-unit-effort (CPUE), proportional stock density (PSD), relative stock density (RSD) and relative weight (Wr) based on length categories. Abundance was expressed as the mean catch-per-unit-effort (CPUE; mean number per net night or mean number per hour of electrofishing). Actual pedal time (time the electrofishing unit produced current) was recorded from the digital display on the control box and used to calculate electrofishing CPUE. Population structural characteristics were expressed as length frequency histograms and stock density indices (PSD and RSD-P). Fish condition was expressed as mean Wr.

## Results and Discussion

Curlew Lake is an important fishery located about thirty minutes from Rapid City. It is a favorite location for many Rapid City anglers in search of walleye, largemouth bass, black crappie and other panfish species. During this survey no black crappie or other panfish were sampled over a length preferred by anglers. In efforts to improve panfish quality and walleye catch rates, a 14-inch minimum length limit was imposed on walleye starting in 2004. In 2007, a 15 inch minimum was imposed on largemouth bass to further improve predator density. If water

levels allow, Curlew is also scheduled to receive biannual stockings of large, fall walleye fingerlings. These two management strategies should help improve this valuable fishery.

### *Fish Community Survey*

Overall, seven fish species were collected during the lake survey conducted June 5-7, 2007 in Curlew (Table 1). Twenty eight hundred eighty-seven fish were collected in frame nets, with black crappies comprising 98.0% of the total. Yellow perch were a distant second at 1.2%. Other species sampled, in order of abundance, were bluegill, golden shiner, walleye, black bullhead, and white sucker.

**Table 1.** Total catch (N), catch per net night (CPUE; 80% CI's in parentheses), catch per net night of stock-length fish (CPUE-S; 80%CI's), proportional stock densities (PSD, RSD-P; 90% CI's in parentheses), and condition factor (Wr for fish  $\geq$  stock length; 80%CI's) for all fish species collected from eight,  $\frac{3}{4}$  inch trapnets in Curlew Lake, Meade County, June 5-7, 2007.

Species	N	CPUE	CPUE-S	PSD	RSD-P	Wr $\geq$ S
Black Bullhead	1	0.1 (0.2)	0.1 (0.2)	--	--	77.6 (--)
Black Crappie	2,825	353.1 (111.7)	216.4 (68.7)	17 (2)	0 (--)	100.7 (1.3)
Bluegill	11	1.4 (0.8)	1.4 (0.8)	0 (--)	0 (--)	105.1 (2.9)
Golden Shiner	7	0.9 (0.7)	--	--	--	--
Walleye	6	0.8 (0.4)	0.8 (0.4)	100 (--)	67 (43)	87.0 (4.5)
White Sucker	1	0.1 (0.2)	0.1 (0.2)	--	--	91.8 (--)
Yellow Perch	36	4.5 (2.6)	4.5 (2.6)	0 (--)	0 (--)	86.3 (3.0)
<b>Total</b>	2,887					

### **Black bullhead**

Catch of bullheads in trap nets from Curlew decreased from 23.5 per net in 2003 to 0.9 last year and 0.6 this survey. The gill nets caught no bullhead as they did last year. All fish captured were greater than 230 mm. The absence of small bullheads may be a sign of predation on young bullheads by the bass and walleye. Mean relative weight (Wr) for stock length and larger bullheads was 103.6 (Table 1).

## Black Crappie

Curlew's fish community was dominated by black crappie. Crappies made up almost 98% of the frame net catch and CPUE for crappies alone was 353.1. Most of these fish are stock length 2 year old fish. Catch of crappie stock length and greater was 216.4 (Table 2, Figure 1). In last year's survey, CPUE was 178.3 and CPUE-S was 12.3. The current management objective is to keep catch of 1 year and older crappie under 100, so some of the Curlew crappie were taken to other local waters. Stock indices fell with the huge push of age two fish. PSD went from 91 last year to 17 this year. RSD-P stayed the same at zero. Fish condition was good with a Wr for stock length and larger fish of 100.7. Growth was slower than the state average (Table 3). Another management objective was to have an RSD-P of over 5. This hasn't improved in recent history.

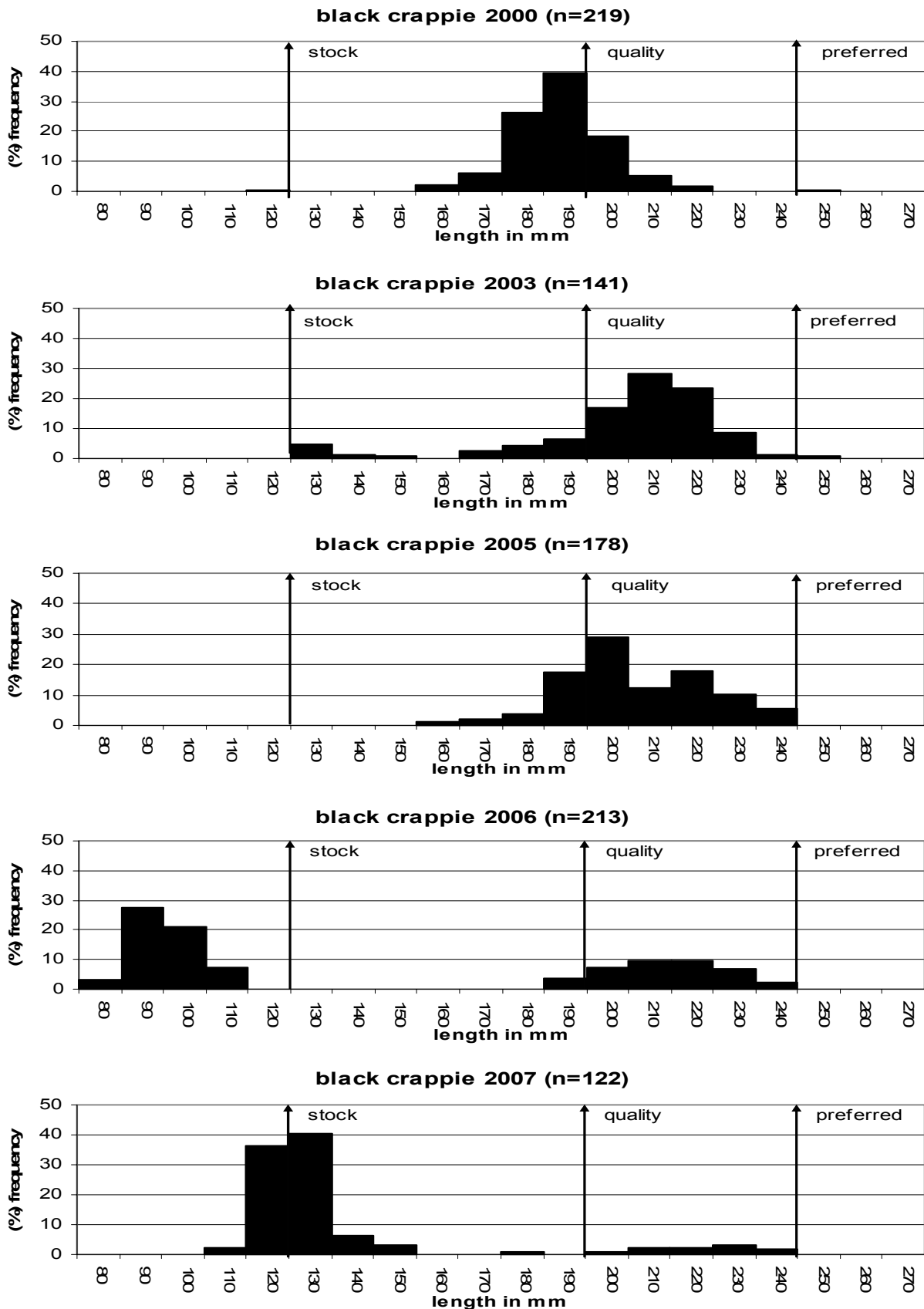
The walleye stocking program and regulation hasn't had much time to improve the size structure and growth of black crappie in Curlew but it seems reasonable that predator numbers need to be higher to influence the crappie population towards management objectives. If the crappie objectives are to be met, predator densities need to increase and, therefore, angling affects on predatory species reduced. In 2007, a 15 inch minimum for largemouth bass will be in place to help achieve the crappie management objectives.

**Table 2.** Composite listing of catch per net night of stock-length fish (CPUE-S; 80%CI's), proportional stock densities (PSD, RSD; 90% CI's in parentheses) and condition factor (Wr for fish  $\geq$  stock length; 80%CI's) for black crappie collected from trapnets in Curlew Lake, Meade County, 2000-2007.

Year	CPUE	CPUE-S	PSD	RSD-P	Wr $\geq$ S
2000	119.6 (59.3)	120.0 (60.0)	26 (3)	0 (--)	--
2003	101.2 (95.4)	101.2 (95.4)	79 (3)	1 (1)	93.3 (0.7)
2005	22.3 (6.5)	22.3 (6.5)	75 (6)	0 (--)	89.7 (1.0)
2006	178.3 (97.8)	12.3 (9.2)	91 (6)	0 (--)	84.5 (0.2)
2007	353.1 (111.7)	216.4 (68.7)	17 (2)	0 (--)	100.7 (1.3)

**Table 3.** Curlew lake black crappie year class, age in 2007, sample size (N), mean back-calculated total length at age, population standard error (SE), the 2007 mean length at age, and the South Dakota black crappie mean length at age (Willis et al. 2001).

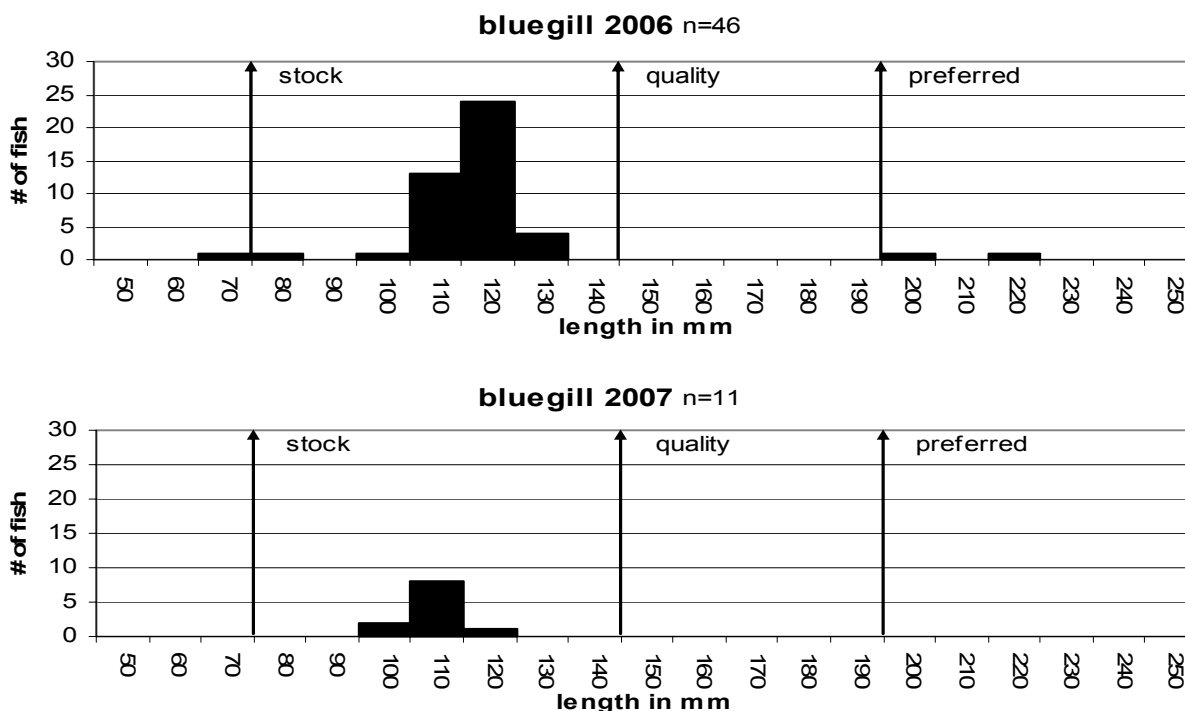
Year Class	Age	N	1	2	Age 3	4	5	6
2005	2	26	69	123				
2004	3	1	69	114	175			
2003	4	3	73	135	175	199		
2002	5	6	75	131	181	209	225	
2001	6	3	70	132	185	209	224	234
Sample size		39						
Mean(SE)			71(1)	127(4)	179(3)	206(3)	224(0)	234(0)
SD mean			83 (2)	147 (4)	195 (5)	229 (6)	249 (6)	



**Figure 1.** Length frequency histogram of black crappie from frame nets at Curlew Lake from 2000-2007.

## Bluegill

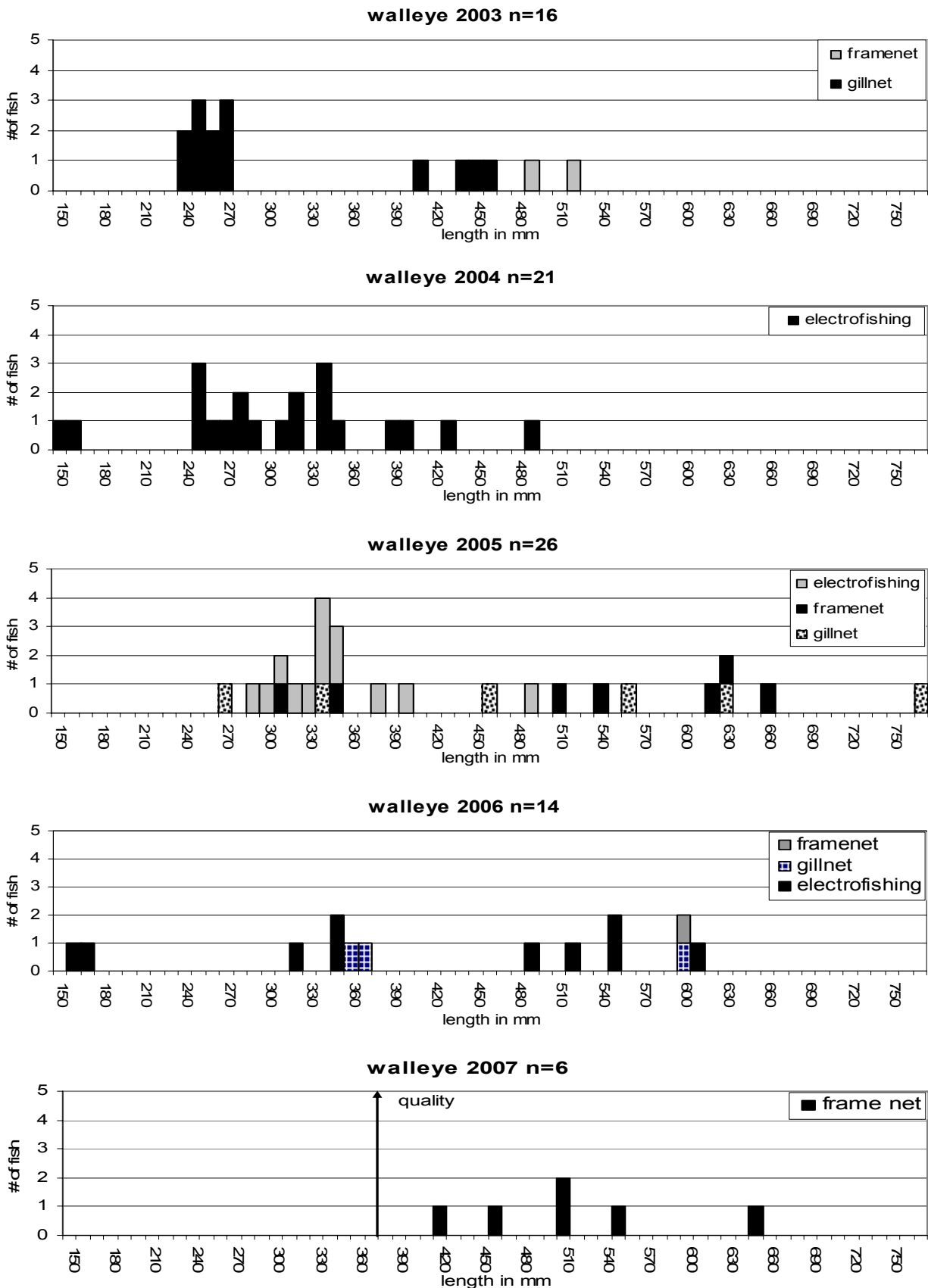
In 2006, bluegill became a major player in the frame net survey with a CPUE of 6.6 and a CPUE-S of 6.4 (Table 1). This year, eleven bluegills were sample by eight frame nets, showing the inability to catch bluegills at times. Length frequency shows the fish sampled were in the 100-120 mm area. Fish condition was excellent with a Wr of 105.1.



**Figure 2.** Length frequency histogram of bluegill from frame nets at Curlew Lake in 2006-2007.

## Walleye

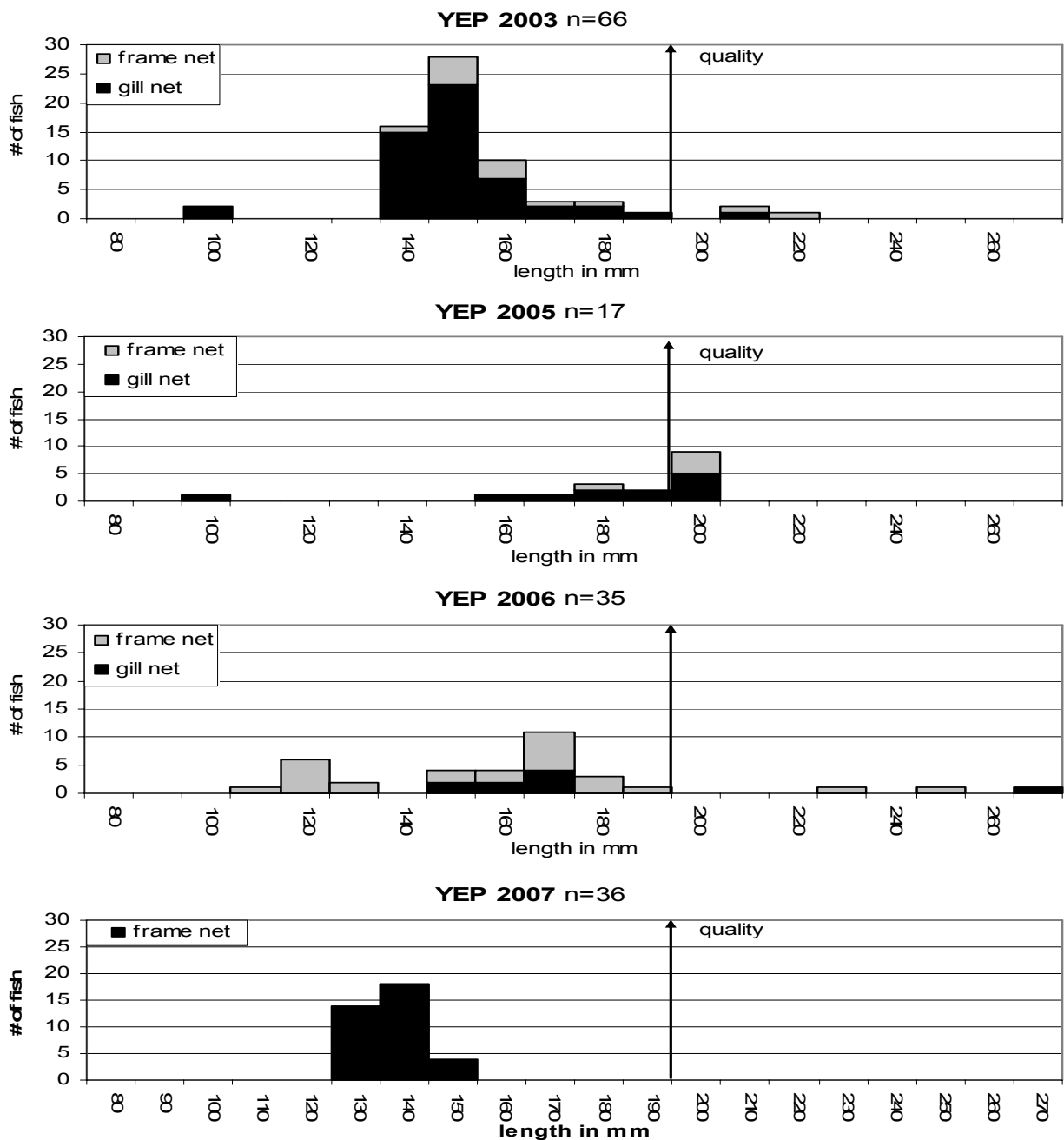
In 2003, 2,174 ten inch fingerlings were stocked (Appendix A). In hopes of establishing quality panfish and walleye fisheries at Curlew, a 14 inch minimum on walleye was put in effect January 1, 2004 to improve walleye density. In the fall of 2004, another 1,956 large fingerling walleye were stocked. Even with the 4,000+ fingerlings stocked in the past four years, walleye density continued to be low with a frame net CPUE at 0.8. Our management objectives are not being met with densities this low. Walleye may be more of a bonus fish instead of a primary fishery as densities remain low even with intense stockings. Possibly low water conditions are affecting sampling or walleye survival. No gill nets or electrofishing was done because of low water, so comparing this data with previous data was not done.



**Figure 3.** Length frequency for walleye from gillnet, frame net and electrofishing catch in Curlew Lake, 2003-2007.

## Yellow Perch

Thirty six perch were sampled in the 8 frame net sets. Fish condition was average with a Wr for stock length and greater fish of 86.3. Length frequency shows all fish sampled were in the 120 - 150mm range (Figure 4).



**Figure 4.** Length frequency for yellow perch from gillnet and framenet catch from 2003-2007.

## **Other fish species**

Northern pike are the other fish suffering from low water in Curlew, and remain low in numbers with a gillnet CPUE of 2.5 (Table 2) and frame net CPUE of 0.1 (Table 1).

## **LITERATURE CITED**

- Francis, J. 1999. Winfin, Version 2.95; Microsoft Access Program for data entry. Nebraska Game and Parks Commission, Lincoln.
- Francis, J. 2000. WinFin Analysis Program. Version 1.5. Nebraska Game and Parks Commission, Lincoln.
- Willis, D.W., B.R. Murphy, and C.S. Guy. 1993. Stock density indices: development, use, and limitations. *Reviews in Fisheries Science* 1(3):203-222.
- Willis, D.W., D.A. Isermann, M.J. Hubers, B.A. Johnson, W.H. Miller, T.R. St. Sauver, J.S. Sorenson, E.G. Unkenholz, and G.A. Wickstrom. 2001. Growth of South Dakota Fishes: A Statewide Summary with means by region and Water Type. Special Report. South Dakota Department of Game, Fish and Parks. Pierre, South Dakota.

## **RECOMMENDATIONS**

1. Continue to stock large walleye fingerling every other year as a second predator.
2. Electrofish annually to get better data sets on walleye and largemouth bass.
3. Survey panfish populations every other year to document effects of the new management strategies.
4. When densities are high, use the Curlew black crappie and bluegill populations to supplement other local populations.

## APPENDICES

### **Appendix A.** Stocking record for Curlew Lake, Meade County, 1989-2007.

<b>Year</b>	<b>Number</b>	<b>Species</b>	<b>Size</b>
1989	1,500	Walleye	Fingerling
1990	15,480	Largemouth bass	Fingerling
1991	14,000	Largemouth bass	Fingerling
1992	13,600	Largemouth bass	Fingerling
	14,000	Walleye	Fingerling
1993	14,000	Walleye	Fingerling
2001	10,920	Largemouth bass	Fingerling
	4,760	Walleye	Fingerling
2002	13,600	Largemouth bass	Fingerling
2003	2,174	Walleye	Lg. Fingerling
2004	1,956	Walleye	Lg. Fingerling

GL

SYMBOLS

SHORELINE

DEPTH CONTOUR

ROADS

HARD SURFACE

GRAVEL

TRAIL

BENCHMARK -- BM

MARSH

GRAZING LAND -- GL

CROPLAND -- CL

WOODED -- W

PARTIALLY WOODED -- PW

CUTBANK C--C

ROCKY SHORELINE R--R

SANDY SHORELINE S--S

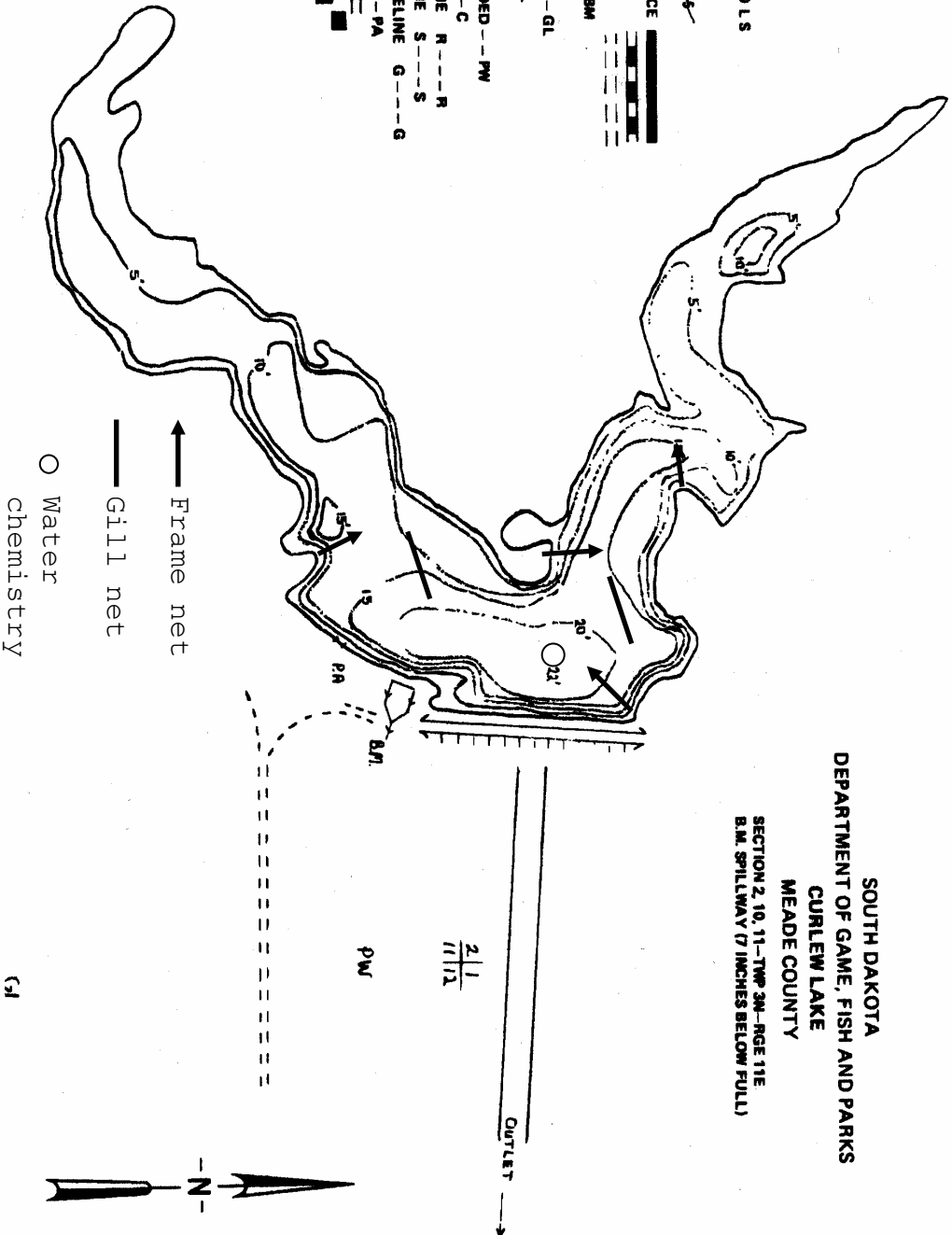
GRAVELLY SHORELINE G--G

PUBLIC ACCESS -- PA

BRIDGE

BUILDINGS

GL



Appendix C. Map of Curlew Lake  
sampling sites

GL